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(54) ISOTOPIC DIAMOND DOPED WITH BORON AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To produce a ^{12}C or ^{13}C isotopic diamond which has purity of a specified value or higher and thermal conductivity of a specified value or higher and is doped with boron, by adding a specified concn. or lower of boron to a carbon raw material consisting of isotopically purified ^{12}C or ^{13}C , a flux and/or their peripheries, diffusing the carbon raw material in the flux under high temp. and high pressure conditions and growing a single crystal on a seed crystal.

SOLUTION: In the this isotopic diamond, the boron concn. is ≤ 100 ppm and purity of the isotopic diamond produced is at least $\geq 99.5\%$ and the thermal conductivity at room temp. is by $\geq 30\%$ higher than that of a high purity diamond having natural isotopic abundance. Preferably, by using a gaseous mixture of a hydrocarbon, carbon monoxide, carbon dioxide or a mixture of at least two of these gases, each of which consists of isotopically purified ^{12}C or ^{13}C , and gaseous hydrogen, as the carbon raw material and also, adding boron as a dopant component, the objective isotopic diamond is formed in a thin-filmy state on a substrate placed in a reactive atmosphere. This isotopic diamond is an excellent material as a material for a device such as semiconductor device or light-emitting device, on which heat is exerted.

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